

THE
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ADOLESCENCE.¹

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During the past decade educators everywhere have been expressing the earnest wish that some man competent to do the work should organize the vast amount of material already accumulated relating to human ontogeny, and interpret it for a theory of education. To accomplish this herculean task one should have considerable familiarity with the methods of investigation and with the more important principles of a number of sciences, especially of biology, palæontology, pathology, psychology, anthropology, physiology, sociology; and to these there should be added an intimate acquaintance with education, in its historical, theoretical, and practical aspects, and with the history of philosophy, religion, and what has come to be known as child-study. In the effort to meet this pressing popular demand there have been a number of attempts within the past half dozen years to organize and evaluate the data in hand concerning special phases of ontogeny, as motor development, linguistic development, and the like. In addition we have been given a few books which have dealt, the majority of them in a very general and quite elementary way, with development as a whole. In method, some have confined themselves very largely to tables and graphs and surfaces of frequency, while others have left statistics aside altogether, and have presented us with generalizations and educational interpretations. These efforts, meritorious as they may be, singly and collectively, still most of them seem preliminary and fragmentary in comparison with Hall's *Adolescence*. In this book we get the broadest view that has yet been taken, so far as I know, in discussing ontogenetic problems.

¹ *Adolescence: Its Psychology and its Relation to Physiology, Anthropology, Sociology, Crime, Sex, Religion and Education.* By G. Stanley Hall. New York, D. Appleton & Co. 1904. Two vols., pp. 589 and 784.

One naturally compares *Adolescence* as a whole and in particular parts with Baldwin's work; and he finds that there are fundamental points of likeness, but there are many points of difference. Hall's range is far greater, but Baldwin goes much more deeply into his specific problem, — the development of mind in the individual, including his intellectual, social, and ethical activities and relations. The latter is systematic, logical, and psychological throughout, while the former covers in great detail many phases of development, but makes no attempt to be systematic or logical in the strict sense. Both are alike in certain basal characteristics, however. For one thing, their work is permeated throughout with modern evolutionary and biological doctrine. Both reject the methods and most of the conclusions of metaphysical and epistemological speculation. Both have the same large aim in view, — to give an account, in the spirit of contemporary biological science, of the natural history of the individual human mind. Both base their story upon the fundamental conception that ontogenesis epitomizes phylogenesis; but Baldwin uses the conception only occasionally, while Hall uses it constantly. Baldwin's discussion of mind is concerned very largely with a description of the developmental phenomena of the individual's conscious utilization of experience to secure adjustment; while Hall regards consciousness as of relatively slight importance in the life of the individual. Nine tenths of mind is submerged; it is neither intellect nor emotion; it is impulsion, instinct, the generalization of ancestral experience running away back into the dim geologic past. Consciousness may be only "a wart raised by the sting of sin, a product of alienation or a remedial process. * * * The moving phantasmagoria of images and conscious objects are not the chief facts of mind, as are the many-voiced comments, the sense of assent and dissent, pleasure and pain, the elation of strength or the æsthetic responses, the play of intuitions, the impulses to do or not to do, automatic tensions or contractions. These are not epiphenomenal, but noumenal in soul life, its palmary facts and experiences."¹

Baldwin's attitude toward his theme is essentially an intellectual and scientific one; he observes, organizes, systematizes, traces causal relations. Hall's attitude is more largely emotional, poetic, ethical, and perhaps hortative. These differences in attitude explain in part differences in temper and tone and style of writing. Baldwin's aim is best realized by means of a comparatively direct, unemotional style, with only a mild use of rhetorical aids; but in all philosophical,

¹ Vol. II., p. 67.

biological, psychological, and educational writing, so far as the reviewer's knowledge goes, there is no verbal architect and artist equal to Hall; none who can approach him in the fervor, the stateliness, the impassionateness, the at times well-nigh overwhelming effect of his rhetoric. This style is, though, well suited to his point of view and his purposes. His vision sweeps from one mountain peak to another, and he must tell what he sees in words and phrases that befit the great scenes which he beholds, and that will stir his listeners to action. To influence the conduct of men, not to convince their intellects, is after all, as I see it, the fundamental motive and *raison d'être* of Hall's work. He has more faith anyway in the impulsions of feeling than in the formulæ of mechanical reason. He does not believe that the highest type of truth about human nature can come from the psychological laboratory. Modern culture represses feeling and 'intellect saps its roots.' The psychologist of the study does not concern himself with the deepest and most characteristic things in soul life—with 'hate that makes men mad or bestial'; with 'love * * * that is stronger than life'; with 'fear that shakes the pulses'; with 'courage that faces death in its cruelest forms unflinchingly'; and with 'torture, and joy that threatens sanity.'¹

But I must turn now to some details of the book in hand. The author shows extraordinary acquaintance with the different sciences which he makes tributary to his subject; and for many years he has himself been amassing data in hitherto unexplored fields of mental development. There is wide difference of opinion to-day among students of psychology and allied subjects respecting the scientific value of these data; but the present reviewer believes that they are on the whole of much worth, as they are employed in *Adolescence*. The author freely acknowledges the difficulty of getting absolutely reliable information by the questionnaire method, and he uses the results therefrom very sparingly and always with caution and qualification, and mainly as *suggestive* rather than conclusive. The evidence bearing upon questions of development and gained from this source is never, as I remember, left to stand alone to prove or disprove anything; it is introduced always in connection with a large body of data gained from other sources. Of late years certain persons have been so disturbed about the questionnaire method of research employed so conspicuously at Clark University, and they have been relieving their feelings so uninterruptedly in the public prints, that several men who had not read *Adolescence* have said to me that they supposed it was a sum-

¹ Vol. II., p. 59.

mary of the articles in the *Pedagogical Seminary* and the *American Journal of Psychology*. Even if it was just this, no apology would need to be made for it; but as a matter of fact these articles occupy a very subordinate place in the book. It is filled with materials drawn mainly from other fields.

These two volumes contain above 600,000 words presented in eighteen chapters, each of which would make a respectable treatise in itself. The first two chapters give the results of a great deal of detailed study by many investigators in many countries of somatic development, both in the large — height and weight — and in respect of individual parts and organs. While we are led to expect from the title of the book that the period from eleven or twelve to maturity will alone be considered, still in these chapters (and in a number of the others) the author sets out with the germ cell, and treats of its natural history during the entire course of development. The pre-adolescent period often receives as much attention as the adolescent period proper. This is, however, very much more satisfactory than if the years before puberty had been ignored altogether.

In the first chapter we are introduced to the doctrine of recapitulation, which is the most prominent thing in the entire book. The evidence upon which the theory is founded is not given in any detail; it is assumed that students are quite generally familiar with this evidence, at least so far as somatic recapitulation is concerned. When it comes to mental recapitulation, treated in later chapters, the author realizes that he is often breaking new ground, and he goes in deeper and turns everything up to view. He appreciates the danger of relying too largely upon this theory, for it is still, even in the biologic field, in a very undeveloped and tentative form; but he has firm faith in the soundness of its fundamental implications, embracing every phase of ontogenetic development. It is apparent, at least to the reviewer, that when the author indicates, with hesitation and caution, a phyletic explanation of some aspect of ontogenetic development, he himself thoroughly believes in his explanation, but his belief is grounded upon insight, shall I say? and not upon evidence that will pass muster in every, or even in any, scientific camp. The statistical type of scientist, who will admit to the rank of science nothing but propositions of a mathematical character derived from his numerical tables, will be certain to think that there is a deal of airy, fact-free speculation in this book, especially pertaining to phylogenetic and ontogenetic relations. It is useless to try to make peace between President Hall and the arithmetician in human development. The former

views any particular expression of human nature in its setting in a great whole of biologic, psychologic and evolutionary construction, while the latter views it simply as one instance of a happening standing apart, unilluminated from any source. It is to the latter simply a mathematical fact, not a fact of life having relations, near or remote, with all phases of the organic universe. Hall does not have many enthusiastic words for the super-refinements of present-day experimental psychology; exact mechanical measurements can never give us the basal and vital truths of the child soul, according to his notion.

Nevertheless, Hall gives us tables and charts very plentifully; but it must be said that he does not make much use of them himself. Take, for instance, his statistics relating to somatic development (especially chapter I., pp. 6-22, and most of chapter II.). Figures are presented in bewildering richness. We are shown the tables of almost every investigator of any repute who has made measurements on the organism as a whole or on any of its parts, but these tables once presented are left to organize and interpret themselves. There is practically no attempt made to account for the differences in the results of different investigators working at the same subject. There is little organization or coördination of these tables; the various tables bearing upon any special phase of growth are not even gathered into an assembling table so that they may be easily compared. When the reader completes these chapters he cannot tell whether or not all these figures establish any law of somatic development. There is a vast amount of material given; and while it impresses one as having been gathered most thoroughly, yet it still remains to be treated so as to show the relations between the work of different investigators, and especially to show the relation between somatic development, as revealed in the tables, and the many other phases of development considered in later chapters. The data need to be treated critically by some one with respect particularly to the precise way in which the data were gained by different investigators, whether they are typical in all cases or of a special class, whether an average gives a faithful estimate of the species studied, or whether to be made of any service we must not know how the phenomena were distributed among individuals examined, and so on. As it is, we are simply given unrelated tables of averages. Not infrequently the statistical results of experimental study dealing with a topic are given in minute detail, and then the author frees himself altogether from his tables and ascends to the heights from which he can get an all-comprehensive view. It is as though his scientific conscience compelled him to give all the figures he could get relating to the theme in hand,

and this done he would be at liberty to engage in more congenial tasks. The discussion of various questions concerning the growth of the body—delay and compensation in growth, the last stages of growth, the advantages of size, differences in nationalities, the view of current genetic science regarding retardation in growth and later accelerated growth, the desirability of maximal growth, the epochal character of somatic development in the light of ontogenetic repetition of phylogenesis, the changes in proportions in growth, harmonious development and its meaning—these themes are handled in a thoroughly original and most interesting and comprehensive manner; but the treatment of them would have been quite as satisfactory and conclusive if no tables had been given.

The educational inferences, as pertaining to somatic development, are drawn with caution, and are unhappily exceedingly limited. But the author has gone as far as the present state of our knowledge will allow. As he says (pp. 28-29), the complexity of the processes occurring in somatic growth is beyond comprehension, so that we really know but little of what actually goes on in the body. Investigations have not yet shown us in any fullness what environmental conditions will help or hinder growth, so that educators must continue to pray in vain for light on this dark problem. The variability of individuals renders the task of the educationist a well-nigh hopelessly complex one. Then the question of nascent periods for the various organs is still far from being answered. President Hall indicates what a stupendous amount of work remains still to be done in the study of growth when he says (p. 128): "The law of nascent periods or the age curve of growth of each organ or faculty is one of the first desiderata of genetic psychology; how to apply it, by what means and to what degree to stimulate each part in its stage of least and most rapid growth, and how to apportion training of mind and body between developing the powers that excel to a degree of specialized culture that corresponds to their hereditary possibilities, or educating the weakest parts and powers in order to improve proportion and symmetry, is one of the chief problems of individual pedagogy."

In chapter III. the 'Growth of Motor Power and Function' is discussed in a large and at the same time penetrating manner. The author attaches supreme importance to muscle culture in the development of mind and morals. The discussion of industrial training, manual training, gymnastics, and play and sport must prove of large theoretic and practical value. Mental and motor activity have been inseparable in the evolution of the race, and they must be inseparable

in the development of the child. Prevent motor action and you arrest mental development. Mind grows just in the measure that impressions, ideas, feelings are appropriately realized in motor action. In education, then, we must provide for the child an environment where a motor life will not only be possible but will be compulsory. Present-day urban schools have gone far astray; they have put books in the place of birds and bees and flowers and fields. They have compelled the child to remain static in hard and fast seats, conning words, when he ought to be out in the open dealing at first hand with concrete, vital situations, in which all the fundamental muscles of his organism are called into play and strengthened and coördinated. President Hall's strictures on the modern school for its neglect of the motor life of the child, and especially of the fundamental muscular activities, have become quite familiar to teachers through his educational addresses, and they have already exerted a tremendous influence for good on school practice.

In chapter IV. we have a very valuable treatise on the 'Diseases of Body and Mind in Adolescence.' This discussion is, however, altogether too technical for one unfamiliar with the terminology and the literature of anatomy, physiology, and especially of pathology. President Hall's interest in psychology makes his treatment of the mental disturbances in adolescence of particular service, though the reviewer has a suspicion that some readers will get an exaggerated notion of the prevalence of mental aberration of various sorts in adolescence. It is highly probable that a good percentage of boys and girls pass through this critical epoch without losing their mental health and balance at any point, so a highly accomplished specialist of large experience in Philadelphia assures me, and my own observation is in full accord with this.

Following the discussion of disease comes a review of 'Juvenile Faults, Immoralities and Crimes' (chapter V.), in which is brought together a vast amount of exceedingly interesting material, especially for the psychologist, the penologist, and the educator. As in other chapters, so here the statistics of all important special investigations are given; and these show conclusively that adolescence is a crucial period for the moral and social life. The author's extraordinary ability in taking account of all the varied manifestations of any phenomenon he is studying is shown here as elsewhere; and it is useless to attempt to even indicate the ground that is covered. It may be added, though, that the therapeutic suggestions in this chapter are especially rich, though some persons will protest against a number of the positions

taken. Many good people to-day would hesitate to put Captain Kidd, Dick Turpin and 'other gory tales' (I., 408) into the hands of their children. Much less would they employ 'judicious and incisive scolding' as a 'moral tonic' (*ibid.*). But the reviewer feels that many of our current pedagogical maxims are grounded upon very insecure foundations, and modern science is certain to destroy them. A pedagogy with its roots in modern biological and evolutionary psychology must give us points of view often quite at variance with the dogmas handed down by theology, metaphysics and 'common sense,' whatever this may be. Whether or not all or even most of the author's educational propositions will stand the test of time, it seems certain at any rate that he is leading us along the right routes; he is indicating the mode of attack upon educational problems that will give us the most satisfactory results. The weakest and shallowest of all criticisms (so prominent in our day) of the teachings of men like Hall is that they are new and unsafe, and we had best cling to what has been tried and 'proven.' If anything has been proven about some of these dogmas we cling to, it is that they are inadequate to our present educational needs and ought to be abandoned.

This leads me to say that in the minds of many educators one of the most doubtful of President Hall's educational doctrines is that concerning his view of the cathartic method of dealing with juvenile errancy. If a boy has a disposition to fight, give him an opportunity to indulge his inclination, and this will relieve him; it will relax his fighting muscles, as it were, and so release his combative feelings. The traditional view of moral defect and deficiency is that the will is lethargic or erratic, and it needs to be quickened or corrected by pains and penalties. If you wish to cure a boy of fighting, then, make it unprofitable for him, in terms of pleasure and pain, to fight. Modern psychology maintains that one's action is always determined by the outcome; if it is pleasurable it will be repeated, if painful it will be abandoned; and it would appear as if the Mosaic law and psychology were in accord in the treatment of human frailties. But still we see that pain does not always prevent misconduct; boys will fight even though the master's rod hangs over their backs. It is shown, too, that boys who have been let alone to work out their own destiny do grow through their anti-social traits and leave them permanently behind. There is reason to believe that the boys who are most repressed in their instinctive tendencies do not most readily and completely get these instincts under control; and as between the primitive and the cathartic methods, the latter seems to have the most in its favor. But

in reality President Hall favors the middle course, the method of transmutation, if I may so name it—exercising instincts in ways not at variance with modern social institutions. Thus we release the mental and motor tensions without indulging the original anti-social motive of the instinct. Our great racial games and plays furnish material for training according to this latter method.

I imagine that the chapters on 'Sexual Development and Hygiene in Boys,' and 'Periodicity in Girls' will be read with greatest profit by physicians and perhaps an occasional parent; though it would prove of immense value if teachers had the training to read with understanding matters of this sort. The discussion on pp. 435-471 deals with matters of supreme importance to every teacher and parent of boys. The same may be said of the discussion with reference to girls on pp. 494-512. The author handles his difficult themes in these chapters with the greatest frankness; and to his mind there is nothing in sexual development or manifestation which should be treated with greater reservation or hedging than in the case of any other phase of development. Science strives single-minded and constantly toward one end—the portrayal of fact, and it ignores the commands of the weak or the timid or the prudish—'Hands off from this or that topic.' It seems to the reviewer that on the whole it is a good thing to keep the minds of the run of people off from sex matters by keeping them on other matters; but there are exceptions. It would not be desirable to have the discussion of sexuality become as common as the discussion of art or politics, say, for it must be that for many to think about it would be for them to revert to primitive practice with reference to it. To control sexuality in most people you must keep them thinking about other things. But it is different when the physician, teacher, or parent discusses the subject; and this makes President Hall's treatment of the subject eminently valuable and timely.

Chapter XVII., treating of adolescence in girls and the educational regimen best adapted to female needs and nature, should properly, it seems, follow directly after chapter VII. In this chapter the author first brings together the results of many studies upon the sexes, showing the differences between them in strength, mortality, cerebral mass and organization, senses, agility, etc., etc. He reviews the medical literature treating of female diseases and the character of female education, and then he presents in great detail arguments to the effect that girls need an education different from that of men. When coeducation is carried on throughout the adolescent period the results are bad in every way; the boys suffer as well as the girls. In

none of his educational doctrines does President Hall run counter to present-day popular opinion and practice more than in this matter of the training of girls. It is suggestive, though, that expert medical, and to a lesser extent educational, opinion is on the author's side. But it will be a long time before the popular mind will give up the notion that because men and women are to live together in maturity they must get acquainted with one another's ways betimes, and have their minds and hearts fashioned by the same educational regimen.

It is possible that President Hall does not in some cases, especially in respect of this question of the education of girls, take due account of the slow development of new types in some respects through the elimination of those who can adapt themselves least well to the conditions of modern life. We may be working out an order of society wherein men and women will be closer together than they are now, alike in ability and in interests. We may be bridging the chasm between male and female; many think thus to-day. At any rate, it is, I believe, an accepted principle of human evolution that there can be no advance in social organization and function without endangering the peace and happiness of those who are unable to adjust themselves to changing conditions. Every new generation has a period of storm and stress and struggle in the effort to become adapted to the complex society into which it is born. A good proportion of every generation cannot achieve adjustment, and all such must suffer the consequences of their misfortune. My point is that the present may be a transitional epoch in the evolution of women, and if so there will be many who cannot adapt themselves fully to the new order, and they will experience all the unhappy consequences of alienation. But does this mean that we must hold progress in check so as to accommodate those who are freighted most heavily with the debris of ancestral life? Should we ignore nature's experiments in producing new types, or should we in our educational regimen plan to conserve those who can establish a new order of sex relations? The reviewer is not arguing a case; he is simply calling attention to the danger of condemning the present order because many suffer or die by the way in trying to adapt themselves thereto. The matter is a good deal more complex than it appears to be at first sight, and to my mind we need a more critical consideration of it than even President Hall gives it. The general principle here in question is applicable to other educational theories advocated by the author, wherein he condemns the tendencies of the times because some children suffer the pains and penalties of mal-adjustment to the new order of things. It

must be remembered that disaster to a portion of the race always follows in the wake of progress.

The chapter on 'Adolescence in Literature, Biography and History' will be read by the uninitiated with greater interest perhaps than any other. The author here gives us mainly the stories in condensed form told by distinguished men and women of their experiences during the adolescent period; though he gives a brief account of the adolescent characters in the works of Plato, Aristotle, Shakespeare, Eliot, *et al.* Parts of this chapter will seem familiar to one who has read somewhat in autobiography; but the study of the lives of the saints—thirty-nine of them—with reference to their adolescent experiences will be decidedly new.

The second volume treats almost entirely of the psychology of development, with special emphasis, of course, upon the adolescent period. Chapter IX. traces the changes which occur in the development of the different senses and of the voice. A considerable amount of special investigation is reviewed and organized in an interesting manner. The author makes no practical suggestions in this chapter, which will be a cause of regret to those educationists whose entire endeavor is devoted to 'training the senses.'

In the opinion of the reviewer the author is at his very best in chapter X. He is discussing evolution and the feelings, and the instincts characteristic of normal adolescence. There are no tables here to limit the range of vision and the breadth of interpretation. One cannot read this without feeling that a bold and powerful intellect is working upon a body of conceptions of tremendous importance and of unlimited scope in the effort to get at the most fundamental truths which they can yield respecting the natural history and the present constitution of the mind of man. It is not too much to say that it is at every point profound and impressive. The author is deeply versed in all the theories that the philosophers have given us respecting the origin and nature of the soul; but evolution alone offers us a satisfactory account of how man's mind originated, and how and why it has become what it now is. The mind of man is the consummation of all the varieties, or perhaps degrees, of mind that have appeared on the earth since life began; and only an infinitesimal part of it ever penetrates up into consciousness; the rest of it remains forever beneath the threshold, and 'can only be studied in motor responses and subconscious psychoses' (II., p. 66). As one reads the author's account of how the human mind has been built he is reminded of Drummond's description of how his body has been built: Contributions have been

made from every age, from every clime, from every species though extinct for unnumbered geologic ages; and at adolescence heredity steps on board and takes control, and if you would adequately understand the psychic changes of this epoch you must have some conception of the natural history of mind from its most primitive beginnings. The adolescent with all the past stirring in his soul and yet needing to adapt himself to the institutions of modern civilized society — this is the individual the author portrays in this chapter.

Space will permit of little more than a mere mention of the titles of remaining chapters. 'Adolescent Love' is treated in chapter XI. The subject is regarded from the physiological, anthropological, phylogenetic, pathological, and psychological standpoints. It is in some part a recapitulation and extension of topics considered in chapters V.-VIII., though there is much new material and interesting points of view regarding courtship, the modes of manifesting sex feeling, and the hygienic and educational treatment of adolescent love. I cannot refrain from quoting a passage in this chapter (II., 142) which illustrates the author's unusually figurative, poetic, and, as I think, extraordinarily effective style, considering the author's leading purpose, which is to arouse the dormant people in education, religion, and so on, and to make men aggressive, dynamic, in searching out the true way in the training of the young, and in strenuously pursuing it. He goes on to say that "one might parody life as a stream from high mountain ranges, which wring it from the clouds, coursing down through all the manifold ways in which the water comes down at Lodore, to the sea of eternity. Adolescence is the chief rapids in this river of life, which may cut a deep cañon and leave its shores a desert. Educational methods, from those of the statesman and the religious founder to those of the artist and man of science and even the pedagogue, are hydrographic engineering which builds a series of well-located and well-devised dams to irrigate wide arid areas or turn the mills of life, or that its floods be stored up against drought and need, so that nothing be lost. Seepage is the waste of licensed vice in otherwise happy families or prosperous civilizations. The rich alluvium of custom and tradition, once rank with a life now gone and forgotten, is the soil or mold from the broad acreage of which culture in all its departments and the most precious values of life grow toward a harvest. Marshes are formed of the rich body of myth and custom, like the coal measures, from which higher utilities may be extracted. Alkaline dead sea plains of phallic detritus may be extracted. * * * Youthful dissipation is the wreckage of a spring freshet

which wears away the dams, makes deep gullies, and may restore the primitive desert."

In chapter XII. the author gives his views of the feelings of the adolescent toward nature, and the necessity of a revolution in our present methods of teaching science, especially geography, botany and physics. As Turkey is the sick man of Europe, so geography is the sick man of the curriculum. Science, all branches of science, as now taught, are formal, mechanical, mathematical, too specialized and analytic, with the result that the students are abandoning the sciences and moving into other fields, though no subject could satisfy adolescent needs so fully as science if rightly taught. The author is 'inconsolable in view of the pathos of the present educational status' of the sciences (II., p. 151). To quote a sentence or two regarding the teaching of botany will suggest the author's views respecting the errors to be avoided in presenting any phase of nature to youth. He says (II., pp. 210-211): 'A botany that begins by merely plucking, collecting, analyzing, classifying and affixing Latin names that mean nothing in place of those that mean everything, desiccating the herbaria, makes havoc with' the study of nature. " * * * Taxonomy has its important function, but here it is not even a necessary evil. The fact that so many young and old maidens wear out a Gray's *Botany* or other text-book, and learn to give uncouth names to all wayside plants, is a pathetic illustration of woman's subserviency to authority or man-made fashion in making something of a stone when her soul cried for bread. If Latin were accepted as the inexorable mind breaking condition, and the whole *circa* 150,000 plant species known, it would not be botany, but a rank crop of Latin tares, and would put the child's soul, which is normally nearer the floral kingdom than the adult's, far away. * * * After the folk-lore stage scientific study at the high school could begin with fertilizing — with the relations of blossoms to insect life, and thus the whole philosophy of sex taught in the delicate, far-off way of the field. Then should come the relations of plant to man, the vine, sugar, cotton, flax, fruit and cereals with something of their domestication. A third human factor, never to be lost sight of, should be the biographic element in the history of botany, from the Herbalists and doctrine of signatures on to Linnaeus and down to the present time. Something of mythic plants, of pests, diseases, struggle for existence, and commercial and industrial botany should also be taught. Drawing should be greatly reduced; much taught without the presence of specimens, and laboratory work minimized save a few experiments on movements, tropisms and plant physiology."

It seems to the reviewer that the substance of this chapter has been presented in various addresses to teachers during the past few years, and the same appears to be true of the last fifteen pages of chapter XV. and much of chapter XVI. on 'Intellectual Development and Education,' wherein the author discusses in an original and thorough-going way the studies and methods of schools from the very beginning on up through the university. It is probable that the views presented in these chapters have been largely the cause of the unrest and aspiration among educators everywhere to-day. If any reader is unacquainted with these theories, no idea of them could be given him here; he must study the chapters. It may, perhaps, be added that while the author is himself, according to his own declaration, an optimist, yet it is to be feared that he will sow the seeds of pessimism in the minds of some of his readers, for pretty much everything that is in education is wrong, or it is at least crude, imperfect, mechanical, based upon logical and *a priori* premises rather than upon the established principles of genetic psychology. Teachers who have not had their minds soaking for some time in modern biological and genetic psychology will be unable to follow the author without many misgivings and pangs of conscience in his radical departure from the traditional curriculum and methods of teaching. Even the normal schools, which ought to be open-minded toward all educational suggestions and least firmly wedded to custom, — even these regard some at least of the author's doctrines with considerable consternation, and anxiety lest they should prove calamitous if actually put into operation. That they would prove disastrous to the policy of some of the static, tradition-loving normal schools is a foregone conclusion.

Chapter XIII. is devoted to a discussion of pubic initiations among savage tribes, ephebic education in ancient Greece and Rome, the treatment of youth in mediæval knighthood, and religious confirmation among the Jews, Catholics, Episcopalians, *et al.* The line of thought developed in this chapter is carried on in chapter XIV., where the adolescent psychology of conversion is examined in great detail. The treatment, from the standpoint of biological psychology, of religious ceremonies and experience, and of theological teaching and practice is essentially new, and must prove of profound interest and significance to all teachers, preachers, and students of human nature. I alluded above to the ferment which the author's pedagogical theories are producing in things educational; but it is to be expected that his views of religious ceremonies and education will create much

greater disturbance in the theological camp. The new psychological orthodoxy is opposed at nearly every point to the theological orthodoxy which many persons have learned memoriter from their catechisms and the lips of their spiritual teachers, and which in the clear light of modern science are seen to be but the 'grimaces and tweaks of religiosity.' We wish President Hall had shown us whether the old orthodoxy has contributed to the development of civilization, or whether evolution has gone on in spite of it; and this wish should be extended to include our entire educational régime, which the new doctrines would abolish in large part.

The social instincts of the adolescent, and the institutions established to meet his social needs receive attention in chapter XV. A wide variety of phenomena are here brought together, and treated as of social reference. Self-consciousness, showing off, affectation, bragging, dress and manners, anger, pugnacity, fear, blushing, bashfulness, pity, sympathy, susceptibility, love of home *vs.* running away, truancy, migrations, imitation, like and dislike of teacher, ideals of vocation, influence of biblical and historical characters, home and foreign ideals, property and the money sense, social judgment, cronies, solitude, ideas of punishment, work together and alone, social organizations, gangs, predatory clubs, student life with its banality, infantilism, class feeling, hazing, secret societies and duelling, associations for youth devised and directed by adults (of which many are discussed), material for moral and social culture, including oratory, the drama, the Bible, the Arthuriad, history—these topics indicate the ground that is covered in this chapter; some of them have been noticed in preceding chapters. The questionnaire as employed at Clark University particularly is more in evidence here than elsewhere in the book, except possibly in chapter XII.; and the topics are of such a character that data concerning them could be gathered quite effectively by this method.

The last chapter treats in a comprehensive and penetrating manner of what the author calls 'Adolescent Races.' The appropriateness of this term may be questioned, since adolescence signifies above everything else rapid transformation or remodeling or evolution. But the races treated in this chapter are not evolving rapidly; indeed, they seem to be, for the most part, permanently arrested. It would seem more consistent to regard the civilized and most progressive peoples as adolescent, since they are pushing upward toward the 'Super-man' with great speed and vigor. But this is a minor matter. We are shown here the results, unhappy for the most part, of an ad-

vanced race attempting to impose its customs, beliefs, standards, ideals upon a lower race. A race must *evolve*; it cannot be dragged up the ladder of civilization. History shows that the savage is on the whole much better off if left to himself than if higher races attempt to enforce civilization upon him. The influence of missionaries even is often extremely harmful. The discussion of this subject from the standpoint of modern biological, anthropological and psychological science is exceedingly timely, in reference especially to our governmental relations with the Filipinos.

Before closing, a further word should be said respecting President Hall's style. At every point he is handling large themes in a large way; and to be most effective he should adopt a large, generous, powerful style. This is just what he does, it seems to me. Everything about it denotes tremendous energy, virility, momentum. From the first sentence to the last you feel its mighty sweep; nothing can stop it. Vast aggregates of particulars are very frequently massed together in a single sentence and then the character and significance of the whole are impressed with striking figures drawn from all phases of human thought and experience. The enumeration of a great body of individual instances falling under a general principle or a class is characteristic of the work throughout. You may open the book at random, and you will not need to read long before running onto a sentence of the character of the following (I., p. 295): "Superficiality, stupid jests, and jollity in the midst of lamentation and world pain, the most bizarre turns of thought, theatrical reference to a spectator, fanaticism, the sharpest contrasts and conflicts of owlsh wisdom and fatuity, selfishness and altruism, idle distraction and great concentrative energy, savagery and tenderness, hypersensitiveness and obtuseness, growth and development concentrated upon any organ and function, so that there is hypertrophy here and atrophy there, sex organs and instincts enormously and prematurely developed or arrested, exotic virtue and brutal crime, exaggerated selfishness and no less extreme generosity and self-abnegation, resistance to authority and exceptional plasticity, fantastic views of life, abhorrence of work, or above all of regularity in occupation, lunacy with misleading lucid intervals, impulsiveness, scrupulosity, and reflection on trifles which may be paranœic — all these occur in different cases and a surprising number may follow each other in one individual."

The author lays under tribute for his figures and illustrations all typical human experiences, and science, literature, including the Bible, — and this especially — history and philosophy, mythology, folk-lore,

and so on. He is so effective in the use of metaphor and simile; abstract principles are so strongly vivified by tying them up to striking concrete experiences of all kinds, that one would read for the æsthetic effect even if he could not appreciate the thought. His is a poetic mind when viewing the natural history of the soul, and he often takes advantage of poetic license in his expressions. He tells us that the 'upward way is strewn with the wreckage of body, mind, and morals' (I., XIV.), and he has no time nor disposition to stop to qualify or explain. Men who like to get their science in mathematical propositions, in strict agreement with proven fact, neither going beyond the fact nor falling behind it — such will feel that the author sometimes gives his poetic temperament too free rein.

There is one quality of the style which may bring the uninitiated to a halt betimes in their reading. The number of strange words met on almost every page is likely to overwhelm a timid novitiate. Of course, it would be expected that when the author was treating his theme from the standpoint of any particular science, he would freely employ the technical terms of that science, and this he does. But in addition he coins a great number of words, and brings over terms from geology, palæontology, biology and all the rest and uses them in psychological descriptions and figures of speech. He is not one of those who think simple Anglo-Saxon words will serve adequately to express the height and depth of any man's thought and feeling. He revels in Greek and Latin combinations; and this will cause many readers to regret that they have not kept themselves fresh in the classic tongues. I think he would at any time rather use a term compounded out of classic roots than a commonplace word from his native tongue, even if he could convey his idea by means of it. He wishes a body of terms for his thought that are not used every day in the goings-on of the shop, the store, the parlor, and so on. See these terms that happen to come to my fingers at the moment: *banausic*, *claustrophobic*, *criminaloid*, *psychokinetic*, *nephelopsychoses*, *cosmocatric*, *auto-hetero-centric*, *autosoteric*, *psychophane*, *homousia*, *archeopsychisms*, *polymorphic*, *macrobiotic*, *psychophores*, *hydrophilia*, *rodomontade*, *hebephramic* and so on *ad libitum*. The author loves to use English as well as Greek and Latin novelties — *historicity*, *too-Docetically*, *Munchausenizes* are samples. Now this supreme command of linguistic forms, both mnemonically and constructively, adds tremendously to the power and effectiveness of the book. If the thought was less massive the style might be considered overgrown, pedantic, pompous; but as it is, content and form seem quite con-

gruous. Students of human nature will feel considerably indebted to President Hall for introducing these terms, some of which, I predict, will speedily find their way into the literature treating of human development. Many of us will think it cause for congratulation that a master of linguistics and a master of modern psychological science in all its associations and ramifications have been joined in the same individual. As a result we have, as I believe, an epoch-making book, not alone for genetic psychology, but also for every science that is in any way concerned with the care and culture of human beings.

PSYCHOLOGICAL LITERATURE.

CHILD PSYCHOLOGY AND PEDAGOGY.

History of Education. E. L. KEMP. Philadelphia, J. B. Lippincott Co., 1904.

Of the making of general histories of education there seems to be no end. A number have appeared in English the past year, and the writer knows of several manuscripts that await publication. With one or two exceptions they are all built upon the same plan; they begin with the educational institutions and practices of the most ancient peoples of which we have any historical records, and they come on down, omitting nothing, until they finally end up with an account of present day systems and methods in the leading countries of the world. In treating of ancient education, especially in China, India, Persia, Egypt, Greece and Rome, they deem it essential to give a description of the geographical situation and features of each country, and some account of the political and social organization of the people, since the educational régime is dependent upon these matters. In presenting the educational ideas of eminent philosophers, as Pythagoras, for instance, they give an outline of his life and the principles of his philosophy. Kemp attempts to accomplish all these things in less than three hundred and fifty octavo pages; and it hardly needs to be said that he must treat his topics in a very general and fragmentary way. The book is evidently written for beginners, however, and it is the author's aim to give them just a glance at what he considers to be the most interesting features of educational practice in all times and countries, and the main points in the educational philosophy of great teachers and reformers. There is doubtless some value to be gained from this mode of treatment by elementary students in normal schools, say, who have had very slight training in history and philosophy, and whose study will cease with their unduly early entrance upon practical work. Mr. Kemp's style is well suited to the needs of students of this character, and in this respect it is an advance upon most of the histories of education designed for beginners.

The chief criticism to be made upon Kemp's book, and all books of which it is typical, is that it is simply a compilation of isolated, and, to a certain extent, unrelated facts. The author wishes his readers to

gain a conception of the evolution of education, to understand the 'genesis and nature of existing institutions, principles and methods.' To my mind, this is just what the student should gain from a course in the history of education; but I cannot see how Mr. Kemp's book is adapted to this end, unless it be supplemented by a great deal of work on the part of the lecturer. The book does not show us how educational principles have come to be what they now are; not a single institution or principle or method is traced down through the ages. Certain facts about each country are presented, and when the chapter is closed we hear no more about it; it is left for good. We have here a chronological record of events, but we learn absolutely nothing respecting their causal connections. No developmental ordering and interpretation of facts is anywhere apparent. The average student will certainly be unable to trace the genesis of our own complex institutions and methods from the isolated materials presented in this book.

It is time we had a history of education, or some phase thereof, written in the spirit of modern evolutionary science, which this book lacks altogether. Teachers need to be got into the genetic attitude. They should be led to see what our present system was in its primitive beginnings, and how our curricula and our methods of teaching and organization have grown up. As it is, they are required to learn by heart what particular men have said about teaching, and what was done in special epochs, but their learning throws no light upon the natural history of the system which they are called upon to administer, and either to conserve in its present form, or to modify in accordance with some sort of educational ideal.

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Ueber Farbenkenntnis bei Schulkindern. MARX LOBSIEN. *Zeitschrift f. Psychol. u. Physiol. d. Sinn.*, 1904, XXXIV., 29-47.

Lobsien made experiments with female children for the purpose of ascertaining differences in their knowledge of color names and in their color preferences. Only the seven rainbow colors were used.

Large colored disks were set up before a white background and at these the children were allowed to look for ten seconds and then to rest from one to one and one-half minutes before another test. The experiments were always made at the same time of day and with clear sunshine.

In the first part of the experiment the children were to write the name of each color presented. They all named red correctly every

time and made very few mistakes with blue. They named yellow and green correctly a great many times but made a large number of mistakes with orange, violet and indigo. The following table shows for each color the failures in per cents:

R	B	Y	G	V	I	O
0	0	4	6	56	85	85

With regard to orange, violet and indigo, there was a decided increase with age in the ability to name these colors, and an increase in the attempt at naming. In their erroneous attempts they usually called the color a tint or shade of the adjacent fundamental color.

In the next part of the experiment the children were asked to state their preference for one of two color disks shown simultaneously. Red was preferred the most and orange the least frequently. The relative number of times each color was preferred in comparison with the rest is indicated in the following table:

R	B	G	Y	V	I	O
409	379	378	299	214	155	141

In the next part of the experiment the children made a choice between two color disks, each of which was composed of two colors in equal proportions. The results were as follows: (1) The children always preferred one combination or the other. (2) The smallest differences in the preferences were between the combinations Y-G and B-I, O-B and Y-I, Y-I and Y-O; the greatest were between O-B and R-B, Y-B and B-V. (3) No single color combination was preferred in every case. (4) The so-called harmonious color combinations R-G, O-B, Y-V, were not so generally preferred as might have been expected.

In conclusion we may note that no comparison is made with other literature on the subject and that the terms used (p. 36) suggest the training rather of the artist than of the psychologist, as red, yellow and blue are spoken of as fundamental colors while green seems to be treated as one of the intermediate.

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Immediate Memory in School Children. W. H. WINCH. *Brit. J. of Psychology*, 1904, I., 127-134.

The method employed in this series of experiments was to expose to the view of a class of school children a set of twelve consonants arranged at random on a card in three lines of four letters each. The card was exposed for 25 seconds and the children were then required

to write down as much of it as they could remember, audible repetition not being permitted. It was found that the letters were not associated with words, and the author believes that there was no association except in time and space. It is not stated whether the children were instructed to read the letters in lines or columns or whether any record was made of the actual procedure in this particular. The method of marking papers is based, however, on the arrangement of the letters in lines and columns. Three credits are allowed for each letter in its right place; two credits for each letter one remove to the right or left, above or below; and one credit for each letter two removes to the right or left, above or below. Letters displaced diagonally or moved more than two spaces are not counted.

Preliminary experiments showed that an interval of twenty-five seconds between showing the card and beginning to write was of no consequence and that the conclusions would not be affected by the difference between girls and boys. The final tests were made on 39 girls between the ages of 8 and 15 years, chosen without reference to their proficiency in school work. On June 5, 1902, ten cards were given; on June 12, at the same hour, ten more were given, and on July 3, fifteen more. No practice between tests is mentioned, but the power of reproduction increased wonderfully from one test to another and this is interpreted as an improvement in 'pure memory.' In the cases of several individuals there was a gain of over 50 per cent. in proficiency from the first to the second test (one week later). The cards of a single test, however, were not compared with one another.

The general ability of these 39 school girls is indicated by the results of examinations in reading, arithmetic, dictation and composition. The position of each girl in her class — based on the year's work and the teacher's estimate — is also given. A very uniform connection is shown between success in the memory test and success in school work. The same connection is shown by further tests on other girls of one class, all about 13 years old, selected from the higher and lower divisions of the class.

The tests also show that memory of the type under discussion improves with age, within the limits chosen, but principally in so far as increased age implies a general increase in proficiency.

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The Psychology of Day Dreams. THEODATE L. SMITH. Amer. J. of Psychol., 1904, XV., 465-488.

The author's data for the article were taken from papers secured

from 1,475 persons, varying in age from six to ninety years. Out of the whole number addressed only five stated positively that they never had day dreams. The universal characteristics are the withdrawal of the attention from the external senses and a greater or less degree of mental automatism.

The contribution contains many points of interest. The characteristics most frequently mentioned are psychic deafness and blindness and muscular relaxation; but day dreaming may occur as an accompaniment of physical activity. The conditions were generally fatigue, monotony, or rhythmic sounds. Day dreaming seems to be a means of mental relaxation. The attention, usually of the passive type, is concentrated on the mental content, which of course differs with the age of the subject. As to the rightness or the wrongness of day dreaming only a small per cent. of children above the fifth grade and adults said it was right, without qualification. Some children said — "Can't help it, and what you can't help isn't wrong." Older subjects recognized its tendency to usurp the place of other activities and to dissipate energy, even though restful in itself. Three types of imagery are apparent: the volitional, the spontaneous and the insistent. The enjoyment of day dreaming, except in morbid cases, is universal. In morbid cases, instead of muscular relaxation, sometimes there is partial paralysis and rigidity of muscles. The painful reverie was reported chiefly by adults, only thirteen cases occurring among children, out of 980 pupils. The tendency to become habitual and excessive appeared in those having strong visual imaginations.

In summarizing the author maintains that every normal mind exhibits certain automatisms in its reproductive activities. Day dreaming appears to be normal and almost universal; its content is mainly environmental, and in childhood it is made up chiefly of memory images, — actual experiences or stories, reproduced. With adolescence there is a greater variety and complexity of content, with an insistence toward future possibilities. In adult life it is often associated with high intellectual endowments and creative power. It may become excessive and pass over into pathological states. Sex differences were found prominent and could generally be determined by the characteristic masculine or feminine type of the paper.

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ANIMAL PSYCHOLOGY.

Contributions to the Study of the Behavior of Lower Organisms.

HERBERT S. JENNINGS. Pub. by the Carnegie Institution of Washington, 1904. Pp. 256.

Professor Jennings in this volume takes his stand against a strict interpretation of the theory of tropisms. The author studies in detail: (1) 'The Reactions of Heat and Cold in the Ciliate Infusoria,' (2) 'Reactions to Light in Ciliates and Flagellates,' and (3) 'Reactions to Stimuli in Certain Rotifera (Metazoa).' With the data thus obtained (using in addition the results of his many former studies) he critically discusses the essential features of the theory of tropisms (paper 4).

The two fundamental assumptions of this theory are: (1) "The movements of organisms toward certain regions and their avoidance of others are due to orientation; *i. e.*, to a certain position which the organism is forced by the external stimulus to take, and which leads the organism toward (or away from) the source of the stimulus without any will or desire of the organism, * * * . (2) "The external agent by which the movement is controlled produces its characteristic effect directly on that part of the body upon which it impinges."

Professor Jennings shows that *orientation* is not a primary or striking factor in the reactions of the organisms studied above, to mechanical stimuli, to chemicals, to heat and cold and to variations in osmotic pressure. "The response in all these cases is produced through a 'motor reflex,' consisting usually of a movement backward, followed by a turning toward a structurally defined side. The direction of turning is thus determined by internal factors."

While orientation is a striking feature in the reactions of these organisms to stimulation by light, the method of orientation is, nevertheless, incompatible with the idea that it is due to the direct action of the stimulus upon the motor organs of the part of the body on which the light impinges. Orientation occurs by turning toward a certain structurally defined side, without regard to the part of the body struck by the light.

The reaction method of the rotifera to the electric current is a 'motor reflex' and hence inconsistent with the tropism schema. In the reactions of infusoria to this stimulus there is only a partial agreement with the requirements of the theory. Professor Jennings is inclined to rule out reactions to the electric current, since it appears to produce results of a peculiar kind which are not comparable to those produced by other methods of stimulation.

The general conclusion that Professor Jennings draws is that the theory of tropisms does not by any means explain the majority of the reactions of the lower organisms. In fact many of them are inconsistent with the demands of the theory. *Variability* in the reactions of such organisms to the same stimuli has been constantly overlooked. This fact leads the author to a study (5) of the 'Physiological States as Determining Factors in the Behavior of Lower Organisms.'

Under this heading the author discusses as types the reactions of the unicellular Stentor and the more highly developed Planarian. He shows by his own carefully conducted experiments that we can distinguish at least six different physiological states in Stentor. Pearl shows corresponding variations in the reactions of the flat worm. The author finally sets forth the view, (1) that the stimulus changes the physiological state of the organism as a whole, and (2) that this change in the physiological state induces a certain type of reaction.

Variability is certainly a stumbling block to the upholders of the theory of tropisms. Proving the existence of variability, however, broadens the field of the psychologist who is interested in animal behavior. As long as experiments seemed to prove the machine-like character of the reactions in lower organisms, the psychologist preferred to turn his attention to the behavior of animals in whose reactions variability is a clearly recognized factor. Removing the barrier of 'uniformity' (and Professor Jennings has done this, at least in the eyes of the reviewer) the behavior of the whole animal series, from amoeba to man, claims the attention of the psychologists.

Passing over Professor Jennings' sixth paper, 'The Movements and Reactions of the Amœba,'¹ which in some ways is the most interesting one presented, since it proves quite conclusively that even here we have to deal with factors which are comparable to the habits, reflexes and automatic activities of higher organisms, we will examine the seventh and last, 'The Method of Trial and Error in the Behavior of Lower Organisms.'

In this paper the author contends that even in the lowest organism the method of behavior is one of trial and error. In the structure and method of locomotion of the flagellates, infusoria and rotifera, we seem to have a 'cunningly devised plan' for permitting this type of behavior. These organisms as they swim through the water revolve on their long axis and continually swerve to a structurally

¹ We pass this paper over for the reason that a knowledge of the results there discussed is not necessary for the continuity of Professor Jennings' argument.

defined side. The organism is therefore successively headed toward many different points of space. At the same time as they pursue their (spiral) course the motion of the cilia by which they swim is constantly pulling 'samples' of the water from a slight distance in advance. When this sample is hotter or colder than the water they usually live in, or contains some strong chemical, the organism reacts in a definite way. It stops, swims backward, and swings its anterior end *farther than usual toward the structurally defined side to which it is already swerving*. Its path is constantly changed until a successful one is finally found. This type of reaction is still more clearly seen in the reactions of an amœba suspended in water in attempting to attach itself to solid objects. It sends out pseudopodia in all directions. If one of these pseudopodia come into contact with a solid object, the rest are withdrawn.

If the type of reaction is one of trial and error, what constitutes 'error' and what success? Here in the eyes of the reviewer is Professor Jennings' weakest point. He uses the old pleasure-pain argument a little disguised. "There is no common thread running through all the different agents which constitute error, save this one, that they are error from the standpoint of the general interests of the organism." Professor Jennings then argues from analogy: "How can we account for the fact that in man we have the same condition of affairs? etc. But to attempt to deal with the problem of negative reactions in the lower organisms without recognizing that they are conditioned in the same way as the negative reactions of man, without admitting the existence of some 'physiological state' analogous to that which is occasioned by pain in man, is, I believe, to close one's eyes to patent realities." Again, we must assume likewise another 'patent reality'—an analogous 'physiological state' corresponding to pleasure in ourselves.

Of course Professor Jennings has a right to make this assumption. In fact he is apparently driven to it if he tries to *assign* a reason for the correct mode of behavior on the part of the organism. But on this theory how would he account for the action of Nereis in selecting glass tubes, which give contact stimuli, even when the tubes are exposed to the direct rays of the sun which kill the worms? (Loeb). Again, if the organism reacts as a whole, by the method of trial and error, in consequence of a change in the total 'physiological state' of the organism, how would Professor Jennings account for the 'new methods' in the *righting* reactions of cut pieces of Planarians (these cut pieces in time, of course, regenerate)? "Here we find pieces of the body, in which the normal

mechanism of the reaction has been destroyed, immediately reaching a certain end (the righting) by a method differing entirely from any that Planarians ever used before to attain the same end, so far as we have evidence" (Pearl, 'Movements and Reactions of Fresh Water Planarians,' a paper which has Professor Jennings' entire approval). Again, Loeb presents in his writings numerous instances analogous to the above. Neither in the paper on 'Physiological States as Determining Factors in the Behavior of Lower Organisms,' nor in his final paper does Professor Jennings cope with this difficulty.

If we grant that Professor Jennings has taken the props from under the theory of tropisms, we must, I think, admit that he in his turn has neither proven that the positive reaction is due to pleasure nor the retractive one to pain. Finally, however much we as psychologists would like to believe that even in the lowest organisms the method of reaction is one of trial and error, we have to admit, I think, that it is straining the point to include the movements which Professor Jennings describes as taking place in the above organisms, under that method. This is plainly evident when we consider the apparently 'successful' reactions of pieces of mutilated organisms.

Psychologie der niedersten Tiere. Eine Untersuchung über die ersten Spuren psychischen Lebens im Tierreiche. FRANZ LUKAS. Wien und Leipzig, Wilhelm Braumüller, 1905. Pp. 276.

Professor Lukas attacks, in a book of the above title, the unfruitful problem of determining at just what stage in the zoölogical scale consciousness makes its appearance. The book is divided systematically into the following parts (corresponding to the ordinary zoölogical classifications):

- I. The Protozoa.
- II. Cœlenterata { Cnidaria.
Ctenophora.
- III. Echinodermata.
- IV. Vermes.

Under each division the author discusses the general anatomical features, the changes in form and metabolism, reaction to stimuli, spontaneous movements, etc., of the various members included in the group.

Professor Lukas rejects the various criteria of consciousness (Loeb, Romanes, Wundt and others), but assumes that mental life may be ascribed to animals on purely logical grounds. If it can be proven

that an animal has organs which function similarly to our own; or secondly, that the animal makes 'expressive movements' similar to our own; or finally, if considerations seem to show that consciousness would be of value to the animal in meeting the requirements of its particular environment, then we have a right to assume the presence of a mental life in that animal — an assumption which is just as logical as that which we make every day regarding the presence of a consciousness in our fellow man.

Looking more intimately into the book we find Professor Lukas denying a mental life to class I. (Protozoa): "We see therefore that all the life activities which we have investigated in the protozoa can be explained as pure reflexes and impulsive movements (*impulse* in the *purely physiological sense*); we have accordingly no ground for assuming that any of these activities are accompanied by consciousness."

Continuing our examination we find that the author denies consciousness to the Sponges and to the Medusæ (Cœlenterata). He finds, however, the first trace of psychical life in the movements exerted by certain of the polyps (the polyp, as is well known, belongs to the same class as that of the Sponges and Medusæ, division II. above) in releasing themselves from objects to which they are attached and in the creeping movements which follow. The reactions of the more highly developed but closely related Medusæ are, according to the author, pure reflexes and impulsive movements.

In analyzing the content of such a rudimentary consciousness, Professor Lukas (accepting Wundt's classification of mental elements) argues that it is unnecessary to assume in it the presence of all three mental elements, since it is extremely unlikely that they appear simultaneously. Mere sensation, which can give information to the organism only about the bare nature of the stimulus, and simple feeling, which can only evaluate the sensation, are alike powerless to produce movement. Primary desire (Begehren) as the psychical occasion (Veranlassung) for the production (Auslösung) of movement, is the only really necessary element to assume in such a primitive consciousness. Desire in this sense does not change the nature of the *purely physiological impulses* which are already at work (these are present of course even in the protozoa); it simply strengthens them, increases their efficacy. Consciousness is an evolutionary factor, then, which comes to the front when the primitive physiological impulses to movements are insufficient or are too weak to overcome difficulties in the environment.

In division III. (Echinodermata) we find present desire, simple sensation and simple feelings, and associations among all three of these elements.

Finally in division IV. (Vermes) we have a still higher grade of consciousness. Taking the cases as a whole we find not only simple desires, simple sensation and feelings together with associations, but perception and acts of recognition as well.

In criticism, we may say that the author's conclusions regarding the behavior of these organisms seem to be based upon but little first-hand experimental evidence. The observations are general and not designed to test his assumptions step by step. The author's lengthy discussions on the anatomy and life history of the animals in question can be largely found in text-books on zoology. His references are to the work of Romanes and to the latter's contemporaries, while the work of Jennings, Pearl, Yerkes, and that of the host of other writers, both in America and in Germany, who for the last three or four years have been studying intelligently, minutely, and laboriously, these same animals, is nowhere mentioned. Finally, the book is full of naïve assumptions both psychological and metaphysical.

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Recherches sur le sens olfactif de l'escargot (Helix pomatia).

EMILE YUNG. Archives de Psychologie, 1904, III., 1-80.

The author gives us a survey of the previous publications concerning the sense organs of the snails. He shows how contradictory most of the reports are which are found in literature, and presents a number of careful experiments made by himself on the sensibility of the snails, chiefly of the large edible snail. Simple observation of the life of the snails shows that they are sensitive to movements of the air, to trembling of the object supporting them, to temperature, and to moisture. Whether they possess an olfactory sense is a question which cannot be answered so easily. They possess an eye at the tip of the large tentacles, but they do not seem to use this in order to distinguish objects. The eye is of very little importance in their life. The author describes in detail his experiments. When a snail is touched anywhere with a pencil point, it reacts by a receding movement of the area of the skin surrounding the point where it has been touched. When the shock received is greater, the whole snail recedes into its shell. The only difference between touching the tentacles and touching any other part of the skin consists in the greater sensibility found

on the tentacles, and particularly the tip of the tentacles. The tip of a tentacle (large or small) is also capable of perceiving the presence of an object at a distance, if this distance is not more than a millimeter. The author is inclined to regard this effect as produced, not by a light or a temperature stimulus, but by an olfactory stimulus. It is possible, he thinks, that the snail is affected by an olfactory stimulus which is too weak to be perceived as an odor by a human being. In order to test the sensitiveness of the snail to olfactory stimuli which we perceive as odors, he used a pencil point moistened, not with water, as in the previous experiments, but with essence of camomile. He found that any point of the skin which was approached by the pencil showed a reaction by a receding movement of the surrounding area. The only difference between the tentacles and other parts of the skin in this respect was found to be a greater sensitiveness of the tentacles. The most sensitive parts are the tips of the large tentacles, next the tips of the small tentacles; least sensitive is the rear part of the back. The relative sensitiveness is measured by the distance at which the different parts of the skin showed an immediate reaction, these distances varying in the case of camomile from 1 to 4 millimeters. The use of other odorous substances did not reveal any difference in the reaction, except that the snail is affected at slightly greater distances by those essences which smell more strongly to us. The receding movement does not indicate that the odor is disagreeable to the snail. The same reaction takes place at the moment when the odor of a carrot or a cabbage leaf is perceived: the tentacle withdraws, but, of course, reappears the next moment. An interesting fact is the rapid decrease in sensitiveness of the snail (just as of man) if the sense organs are exposed for a short time to the same olfactory stimulus.

The author now raises the question, at what distance a snail perceives the presence of nourishing substances, of its most common food. His numerous careful experiments prove that the snails are unable to find their food by the aid of its odor if the distance is at all considerable, more than 10 centimeters or so. The usual reports concerning the ease with which snails in nature are said to find their food by the odor, must therefore be regarded as greatly exaggerated and based on superficial observation of the conditions of the case. The author further deprived many snails of one or both of the pairs of tentacles. Their reactions showed a lesser sensitiveness to odors, but by no means insensibility.

The last part of the paper contains a critical discussion of the anatomical facts known, including some work of the author himself

The sensory cells found in the tentacles and other parts of the skin differ but slightly. He reaches the conclusion that neither the sensitiveness of the different parts of the body surface nor the structure of the sensitive cells under these different parts permit the assumption of any differentiation in the sensory function of the several parts of the body surface. The only approach towards a differentiation which one may speak of consists in the greater accumulation of sensory cells on certain areas (especially the tips of the tentacles) than on others. The name of 'the olfactory organs' which is so commonly applied to the large tentacles is not in accordance with the facts. They are neither more nor less 'olfactory organs' than any other point of the body surface.

Sur la biologie et la psychologie d'une araignée (Chiracanthium carnifex Fabricius). A. LECAILLON. Année Psychologique, 1904, X., 63-83.

The animal whose maternal instincts the author has studied is a spider common in oatfields. The female builds a nest on the top of an oat plant, lays about 160 eggs which she collects in a cocoon, and then closes the nest completely, staying within until the young have sufficiently developed to take care of themselves. The purpose of the mother's presence in the nest is to afford protection. If by any accident the nest is broken open, the mother at once sets to work repairing and closing it again. The author subjects this maternal instinct of the spider to several interesting tests. The chief results of his experiments are the following: The spider's attachment to the nest grows while she stays within. It is stronger after some of the young are hatched than when unhatched eggs alone are present in the nest. If a nest is opened, the mother removed, and another female placed on the nest, the latter adopts the nest, enters and at once begins to close it. She is, however, easily driven out by the mother, if this one is soon placed on the nest. But if the foster mother is left in possession of the nest for a number of days, her attachment to it becomes so strong that she defends it against the legitimate mother when the latter is replaced, until one of the contestants remains dead. Even the real mother's attachment to her nest weakens gradually, however, if she is separated from it for rather a long time. The spider does not take any interest at all in the individual young. If the nest is opened and some of the young spiders escape, the mother does not make the slightest effort to prevent them from doing so. All she does is to repair the nest. On this her whole attention seems concentrated.

One nest was broken by the author into pieces beyond repair. The mother remained with the pieces, throwing now and then a silk thread across them, until she died.

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EVOLUTION AND HEREDITY.

A Factor in Mental Development. MARGARET FLOY WASHBURN.
Philos. Review, 1904, XIII., 622-626.

In this article the author expands the idea that 'upon the possibility of reacting to stimulation that neither hurts nor helps the organism at the moment of its operation, may rest the basis of all higher mental development.'

Briefly summarizing, she says that the progress in mental evolution has been marked in two respects: (1) advance in power to discriminate among stimuli; (2) the rise of the power to form 'free ideas.'

The author states that the aim of the paper is to indicate how both these gains of psychic evolution have been dependent principally on 'the organism's growing power to react to stimuli not in immediate contact with the body,' and discusses in a general way well-known facts in experimental psychology. In substance she states that an increase in the number of discriminable sensations within a given sense department means one of two things: (a) qualitative discrimination becomes more highly developed; (b) local discriminations become finer.

All such growth has been conditioned by the vital needs of the organism. Under this latter statement, two laws are briefly discussed: (1) 'qualitative discrimination has been developed with reference to stimuli that do not immediately hurt or help the organism'; (2) stimuli that are or may be harmful or helpful at the moment of their application, have given rise to local discrimination at the expense of 'qualitative distinctions.'

In discussing the principle involved in the problem of the rise of free images, the author states that there are three stages of development in response to stimulation: (1) The primitive condition where the animal does not learn by individual experience; (2) the stage of development where the animal learns by experience, without, however, having the power to recall the image of its experience; (3) the possibility of an image, purely centrally excited, not leading immedi-

ately to movement, when a process similar to the original may be set up, not by an influx of energy from without, but by the weaker nervous current coming from some other central sensory region, showing that the nervous substance must have been far more profoundly affected by the original stimulus than it was by either of the earlier stages.

The characteristics of such stimulus are: (*a*) intensity, (*b*) duration. The source of the image-forming power is, then, delayed reaction, 'made gradually possible by increasing sensitiveness of the organism to stimuli only indirectly affecting its welfare.' The author ventures the suggestion that this principle (applicable to lower organisms) may help to explain why the fully developed mind gets 'from the senses whose stimuli do not indicate direct contact of a beneficial or harmful object with the body, its clearest and most controllable images,' while, on the other hand, the more obscure image is obtained from the closer and more direct stimulation — touch and organic sensations. The senses giving rise to æsthetic feelings are the so-called higher senses — that is, those with greatest qualitative differentiation, with clearest images, with stimuli demanding least immediate and instant reaction. The affective tone of impressions depends on the relation of the elements, and upon the relation of these elements depends the delayed motor response. The lower senses permit no dwelling on the relation between the sensory effects of different stimuli.

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Il Destino delle Dinastie. L'Eredità Morbosa nella Storia. A. RENDA. Torino, Bocca, 1904.

The purpose of this essay is to put in evidence previous contributions, then to treat history from the viewpoint of psychology and psychopathology; to make certain observations on the complicated and obscure problems of heredity; to draw from the analysis of the hereditary development of psychic and psychopathic phenomena those consequences which illuminate the genesis and nature of being.

In spite of the development of knowledge, the new light thrown upon the biological problems of the evolutionary theory and the study of embryology, the phenomena of heredity are uncertain. Despite such hypotheses as Darwin's pangenesis, Weissmann's plasmic continuity, Spencer's polarigenesis, and Haeckel's perigenesis, the question remains, Are all the characteristics transmissible? And do these include those which are accidental, such as mutilations, or only those which are specific, or those which, being acquired, have modified the

germinal cells? The possibility of determining preventatively the future of those to be born, from one's knowledge of the parents, is a scientific mirage. But from history the extent of the genealogical tables of reigning families has the advantage of a cycle computed from actual occurrences. This permits one to follow the psychic history of a familiar group from its origin to its extinction; to observe the casual entrance of hereditary blight, to mark its growth, to describe all its modifications and to study the reversions. The chief source of error here is disregarding the disturbing influence exercised upon the conduct of rulers by the state of authority, the families which surround them, the traditions, social institutions and political exigencies of their environment. Hereby the results are modified. Volitions and character, inhibited and modified by direct external pressure, lose something of their genuine physiognomy. Still within three or four generations the first symptoms of lesion disturb the heroic hereditary fiber and signs of weakness and madness appear. Here the organic analogies of sociology are erroneous, yet there is a sort of collective biological evolution in which destructive microbes, as it were, hasten degeneration. The decline of aristocracies is attributable to the infiltration of inferior elements into a well-born group, although this may be repaired by systematic selection. Here psychic dynamism, because of its influence upon moral personality, ought to produce in the cerebral life a functional disturbance, and be the beginning of mental maladies and grave nervous affections (Jacoby); however, it cannot be proven that such power or ability is the essential and unconditioned factor of increasing morbidity. There are also to be considered lack of self-control, of impulsive inhibition, of moral sense, of respect for human life and of those sympathetic feelings which depend upon the circumstances of the times.

There is no doubt but that consanguinity in marriage has a baleful effect, since a subsequent cross-breeding does not greatly alter the psychic physiognomy. In the neuropathic tendencies of dynasties Orchansky's results are applicable: (1) The maladies of the father tend to be reinforced in the male line; (2) paternal heredity is progressive; (3) the first born are the most seriously affected; (4) the maternal heredity is, contrariwise, beneficial, depending perhaps upon the greater stability of the female organism. To this last view, which contradicts Lombroso, may be added the principle of Doubleday and Howorth that excessive prosperity of the individual is fatal to the prosperity of the species, since the privileged classes live in a parasitic state and thereby lack stimuli to action. Among all these conditions,

consanguinity and the greater degenerative tendency of males are the chief biological and social factors. In dynasties these lead to sterility, premature death, idiocy and moral madness. Germs of these things are also in all of us. The perfectly healthy man is an abstraction.

In part II. these principles are applied to the neurotic dynasties of Augustus, the Medici, the family of Charles V., the houses of Capet and Valois. Turning from the genealogical tables, part III treats of the contribution of art. Here the drama is said to have value in so far as it presents the conclusions of heredity, not the mysterious process of the formation of character. A study of the Plantagenets according to history and Shakespeare, furnishes the curve of degeneration showing the convergence of heredity as a cause. It is not here possible to construct an exact clinical scheme, but with the appearance of epilepsy and imbecility there come, in the first generation subsequent, epileptic equivalents; in the second and fourth, convulsions; in the fifth, a true epileptic psychosis: in the seventh, epilepsy with vertigo and unconsciousness, etc. In the English dynasty there appears an epileptic neurosis accompanied by deficiency or imbecility. Here Morel distinguishes four phases: in the first generation, irritability and cerebral congestions; in the second, intensification of the same, apoplexy and cases of grave neurosis, epilepsy, hysteria and hypochondria; in the third, eccentricity, lack of equilibrium; in the fourth, deaf-mutism, deficiency, precocious dementia. While Tiggles proves the inconstancy of this progressive degeneration, the end of the process is always idiocy, imbecility and sterility. In brief, a nervous diathesis forms a connecting link between two morbid episodes or between two metatheses of an hereditary neurosis; while the passions are symptoms and psychopathic equivalents of a morbid process such as appears in mental maladies and anomalies. Returning to a concrete problem, the pedigrees of the French, English and Spanish dynasties exhibit instances of melancholia, persecutory paranoia, jealousy and avarice. Applying Galton's law, it is found that a descendant does not represent an arithmetical sum of the quantity of his ascendants, but possesses the quality of an ancestor from whom he derives an impression common to the family. In some cases morbid forms reappear with such persistency as to give a characteristic physiognomy even to the last of the line. In such a case the psychopathic personality of an individual is given from the prevalence in one group of a quality distinct from the other psychophysical elements with which it is associated. In conclusion it is said that the degeneration of ruling houses, especially of the nobility, has perhaps little force

nowadays because of the wider social forces at work; the study of such a tendency being merely one side of the polyhedron of humanity.

I. WOODBRIDGE RILEY.

JOHNS HOPKINS UNIVERSITY.

Sulla quistione del genio. VINCENZO ALLARA. Archiv für systematische philosophie, X., 2, 1904.

There are two predominant theories of genius: the physiological considers genius a superior faculty but always in exclusive and perfect relations with the physiological conditions of the organism in general and of the nervous system in particular, the other theory is the pathological, degenerative, or Lombrosian. The former is founded on insufficient evidence, the latter exclusively on pathological complications, which form both its strength and weakness. A mediating view makes genius a higher faculty entirely physiological but modified by pathological conditions of various kinds and degrees, be they transitory or permanent, inherited or acquired. If, as with Lombroso, genius and talent are synonymous, the latter should be considered as pathologically conditioned, as well as all intellection, whether negative or positive; for imbecility and idiocy and cretinism, as also normal thinking, are always emanations or secretions of the nerve cells.

Without carrying pathology to extremes, all men who have the least talent or genius possess pathological stigmata; especially do hydrocephaly and meningitis irritate and increase the functional activity of the brain cells. And yet genius cannot be considered as a manifestation entirely pathological, as a degeneration, for men without genius possess an exaggerated sensibility to meteorological conditions and this may be explained on psychological grounds.

I. WOODBRIDGE RILEY.

General Intelligence, Objectively Determined and Measured. C. SPEARMAN. Amer. J. of Psych., 1904, XV., 201-293.

The purport of this article is " 'Correlational Psychology,' for the purpose of positively determining all psychical tendencies, and in particular those which connect together the so-called 'mental tests' with psychical activities of greater generality and interest."

The past fails to establish any positive conclusions fixing a definite status of correlation. Either 'General Intelligence' does not exist, or else it is a mere term of designation. Former experiments lack the value that is to be obtained through the adoption of some 'adequate system for proving and measuring associative tendencies.' Mathematical exactness is the keynote of the present work.

Experiments were conducted in discrimination in sight, sound and weight. The apparatus used for sound was a monochord so furnished with a Vernier scale that a difference of pitch of one third of a vibration could be produced; for sight, platinum prints obtained by photographic means; and for weight, a graduated series of weights of the 'cartridge' pattern. Five experimental series are reported, the reagents in two instances were children of a village school, in two others high school pupils, and in the final one male and female adults. The method employed was that of 'procedure with half knowledge'. In estimating intelligence, four kinds were noted — school classification based upon examinations, native capacity, teachers' estimate, as 'bright,' 'dull' or 'average,' and common sense.

By far the most important feature is the method of correlation, and in this the author has employed Pearson's 'product moments' together with 'rank differences' and 'class averages,' all of which are carefully described in the author's earlier article, 'The Proof and Measurement of Association between Two Things,' *The American Journal of Psychology*, 1904, Vol. XV., pp. 72-101. Great care has been taken to eliminate all errors of observation and all irrelevant factors. Complete tables of actually measured results with the various correlations expressed in mathematical units are included with the hope that 'we shall eventually reach our pedagogical conclusions, not by easy subjective theories, nor by the insignificant range of personal experiences, nor yet by some catchpenny exceptional cases, but rather by an adequately representative array of established facts.'

The conclusions reached by the author are in part as follows:

1. "The results hitherto obtained in respect of psychic correlation would, if true, be almost fatal to experimental psychology as a profitable branch of science. But none of these results, as at present standing, can be considered to possess any value other than suggestive merely; this fact is not so much due to individual short-comings of the investigators, as to the general non-existence of any adequate system of investigation."

2. "On making good this methodological deficiency, there is found to actually occur a correspondence — continually varying in amount according to the experimental conditions — between all the forms of sensory discrimination and the more complicated intellectual activities of practical life."

3. "By this same new system of methodics, there is also shown to exist a correspondence between what may provisionally be called 'general discrimination' and 'general intelligence' which works out with great approximation to *one or absoluteness*."

4. "The above and other analogous facts indicate *that all branches of intellectual activity have in common one fundamental function (or group of functions), whereas the remaining or specific elements of the activity seem in every case to be wholly different from that in all the others.*"

5. "As an important practical consequence of this universal unity of the intellectual function, the various actual forms of mental activity constitute a stably interconnected Hierarchy according to their different degrees of intellective saturation."

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BOOKS RECEIVED FROM MARCH 5 TO APRIL 5.

Greek Thinkers: A History of Ancient Philosophy. TH. GOMPERZ. Trans. by G. G. BERRY. Vols. II., III. New York, Scribners, 1905. Pp. xii + 397, and vii + 386.

Logic, Inductive and Deductive. J. G. HIBBEN. New York, Scribners, 1905. Pp. xvi + 439.

Philosophical Orientation and Scientific Standpoints. JAMES WARD. Address before Univ. of Calif. Philos. Union, 1904. Berkeley, Univ. Press, 1904. Pp. 24.

The Wonders of Life. ERNST HAECKEL. Trans. by JOSEPH McCABE. New York and London, Harper & Bros., 1905. Pp. xi + 485.

Recherches cliniques et thérapeutiques sur l'épilepsie, l'hystérie et l'idiotie. BOURNEVILLE and others. Paris, Progrès Médical; Alcan, 1904. Pp. clxxxiv + 346.

Beiträge zur Gedächtnisforschung. F. REUTHER. Sonderab. aus Wundt's *Psychologische Studien*, Bd I, h. 1. Leipzig, Engelmann, 1905. Pp. 102.

NOTES AND NEWS.

IN connection with the international exposition to be held at Liège, Belgium, from April to November, during the present year, there will be held an International Congress of Education from September 17 to 20, inclusive. The purpose of the Congress is to consider the best means of promoting the physical, intellectual and moral development of the young in the home, the school and society.

The Congress will be organized in four sections, as follows: (1) Education of Children; (2) Study of Children; (3) Care and Training of Abnormal Children; (4) Parents' Associations, Mothers' Clubs and Other Supplementary Agencies for the Improvement of Youth. Membership in the Congress is solicited from educational institutions and associations, societies for the protection and guardianship of youth, students of the psychology of childhood, teachers, philanthropists and parents. The membership fee (ten francs) may be sent direct to the Secretary of the Congress, Louis Pien, No. 44 Rue Rubens, Brussels, Belgium, or to any member of the American committee.

To promote an interest in the Liège International Congress in the United States, the Commissioner of Education and the Secretary of the Interior have appointed the following American committee:

Chairman, Professor M. V. O'Shea, University of Wisconsin, Madison, Wis.; Secretary, Professor Will S. Monroe, State Normal School, Westfield, Mass.; the Hon. Alfred Bayliss, State Superintendent of Public Instruction, Springfield, Ill.; Miss Ellen M. Henrotin, Chicago, Ill.; Professor A. Caswell Ellis, University of Texas, Austin, Tex.; the Hon. Richard S. Tuthill, Chicago, Ill.; Professor William H. Burnham, Clark University, Worcester, Mass.; Mr. Charles W. Birtwell, Children's Aid Society, Boston, Mass.; President E. G. Lancaster, Olivet College, Olivet, Mich., and Dr. Tolman, Bureau of Education, Washington, D. C.

A joint committee in Paris and La Dorgonne — his native Province — has been formed to gather funds for a monument to the memory of Gabriel Tarde, the distinguished sociologist. Subscriptions may be sent to the treasurer, M. Félix Alcan, 108 Boulevard St. Germain, Paris.

Professor Geo. L. Raymond, Litt.D., formerly Professor in Princeton University, has been appointed Professor of *Æsthetics* in the George Washington University, Washington, D. C.

Assistant Professor J. B. Watson, of the University of Chicago, is doing special work, during the Spring quarter, at the Johns Hopkins University. It is also announced at the Johns Hopkins that Dr. Scripture cannot fulfil his engagement to lecture there this spring, being detained in Europe by the critical illness of one of his children.

PROFESSOR J. MARK BALDWIN has engaged to give a course of lectures on 'Genetic Logic' in the summer school of the University of California, June 26 to August 6.

THE following are gathered from the press:

PROFESSOR WILLIAM JAMES, of Harvard University, has accepted the acting professorship of philosophy at Stanford University. He will lecture at Stanford during the second half of the next academic year and will organize a department of philosophy for the university.

To perpetuate the memory of C. L. Herrick, and as a tribute of gratitude for his services, the Denison Scientific Association has appointed a committee to secure a fund to be known as the 'C. L. Herrick Memorial Fund.' Subscriptions may be sent to Professor Frank Carney, Denison, Ohio.

DR. R. S. WOODWORTH, instructor in psychology in Columbia University, has been promoted to an adjunct professorship.

We cite from *Nature* the following announcement, presuming that the studentship is open to American competitors: An Arnold Gersterberg studentship will be offered for competition in the Michaelmas term of 1906 (at Cambridge). Every candidate must send on or before October 1, 1906, an essay on one of the following subjects to Dr. James Ward, Trinity College, Cambridge. The value of the studentship is about ninety pounds, tenable for two years if work be satisfactory. Subjects: (1) A philosophical discussion of Energy and particularly of the new theory of Energetics; (2) A critical examination of Descartes' Philosophy of Nature; (3) The Relation of Mathematics and the Theory of Probability to Physics; (4) The Theory of Psycho-physical Parallelism; (5) The scope and methods of Comparative Psychology; (6) The Philosophical Import of Post-Darwinian Theories of Natural Selection.

